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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Russell Hudyma

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11/16/2005

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EXAMINER

PRITCHETT, JOSHUA L

ART UNIT

PAPER NUMBER

2872

DATE MAILED: 11/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/771,986	Applicant(s) HUDYMA, RUSSELL	
	Examiner Joshua L. Pritchett	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-14 and 16-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-14 and 16-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

## DETAILED ACTION

This action is in response to Amendment after non-final rejection filed September 29, 2005. Claims 1, 7 and 11 have been amended as requested by the applicant.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 2, 4-14 and 16-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The newly amended limitation to require the virtual image be formed “physically and optically behind the sixth mirror” was not present in the original disclosure of the invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 1, 2, 4-14 and 16-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1 and 7 the claims require that the virtual image be formed “physically and optically behind the sixth mirror.” The term “behind” leaves open several interpretations. Changing the term to either “object side” (ie. further to the left in Fig. 1 of the current application) or “image side” (ie. further to the right in Fig. 1 of the current application) would better define the physical location of the image. For defining the optical location the examiner suggest using the phrase “further along the optical beam path” then stating the desired optical element.

Regarding claim 11, the claim requires that “the entire first optical group” form the virtual image. It is not clear from either the specification or the drawings how the entire optical group forms the virtual image.

The remaining claims depend from claims 1, 7 and 11 and inherit the deficiencies thereof.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 4-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shafer (US 2001/0043391) in view of Takahashi (US 6,172,825).

Regarding claims 1 and 7, Shafer teaches a photolithographic reduction projection catadioptric objective with a beam path comprising a first group (G1) including an even number of at least four (M1-M4) and a second at least substantially dioptric optical group (G2) more imageward than the first optical group including a number of lenses (Fig. 4) and wherein the first optical group provides compensative axial color correction for the second optical group (para 0014). Shafer states that the "first optical group provides compensative aberrative correction for the second optical group." "Compensative aberrative correction" is a broader limitation than the specific axial color correction claimed in claim 1, therefore Shafer anticipates the claim limitation. Shafer lacks reference to a virtual image formed physically and optically behind the sixth mirror of the first optical group. Takahashi teaches a six-mirror projection system that includes a virtual intermediate image formed by the entire first optical group physically and optically behind the sixth mirror (Fig. 1). The applicant's drawing show the virtual image formed between mirrors four (M4) and five (M5). Takahashi shows the same location of the virtual image with respect to the sixth mirror and therefore would also satisfy the limitation requiring the image formed by the entire group. Takahashi further teaches the image formed by the entire first optical system (Fig. 1) because it is not formed using any of the optics of the second optical system. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the first

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optic group of Shafer have the virtual intermediate image of formed at the location taught by Takahashi for the purpose of maintaining the integrity of the image to be projected.

Regarding claims 2, 9 and 10, Shafer teaches wherein the numerical aperture is 0.75 or more (para. 0014).

Regarding claim 4, Shafer teaches wherein the at least four mirror of the first optical group include a convex mirror arranged most imageward in the beam path of the objective, and wherein the second optical group receives a beam from the convex mirror (Fig. 4).

Regarding claim 5, Shafer teaches wherein optical surfaces of each mirror of the objective are at least sections of surfaces of revolution each having a common axis of symmetry (Fig. 4; para. 0015).

Regarding claims 6, 8 and 12, Shafer teaches wherein the second optical group is configured for independent compensative lateral aberrative correction. Page 9 of the current application states, "Fig. 1 shows aperture stop AS in Group G2 placed in a quasi-symmetrical manner, allowing the lateral chromatic aberration to be at least nearly self corrected within group G2 itself." Shafer teaches an aperture stop (Fig. 4) and therefore would be capable of the claimed performance as claimed.

Claims 11, 13, 14 and 16-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shafer (2001/0043391) in view of Braat (US 6,255,661).

Regarding claim 11, Shafer teaches a photolithographic reduction projection catadioptric objective with a beam path comprising a first group (G1) including an even number of at least six mirrors (para 0056) and a second at least substantially dioptric

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optical group (G2) more imageward than the first optical group including a number of lenses (Fig. 4) and wherein the first optical group provides compensative axial color correction for the second optical group (para. 0014). Shafer states that the “first optical group provides compensative aberrative correction for the second optical group.”

“Compensative aberrative correction” is a broader limitation than the specific axial color correction claimed in claim 1, therefore Shafer anticipates the claim limitation. Shafer lacks reference to a virtual intermediate image formed between the fourth and fifth mirrors. Braat teaches a virtual intermediate image formed between the fourth and fifth mirrors optically behind the entire first optical group (abstract). Braat teaches the virtual image in the location shown by Fig. 1 of the current application. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the first optical group of Shafer have the intermediate image formed at the location taught by Braat for the purpose of maintaining a coherent image through the projection system.

Regarding claim 13, Shafer teaches a photolithographic reduction projection catadioptric objective with a beam path comprising a first group (G1) including an even number of at least six mirrors (para 0056) and a second at least substantially dioptric optical group (G2) more imageward than the first optical group including a number of lenses (Fig. 4) and wherein the first optical group provides compensative axial color correction for the second optical group (para. 0014). Shafer states that the “first optical group provides compensative aberrative correction for the second optical group.”

“Compensative aberrative correction” is a broader limitation than the specific axial color correction claimed in claim 1, therefore Shafer anticipates the claim limitation. Shafer

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lacks reference to the third and fourth mirrors located physically between the first and second mirrors. Braat teaches the third and fourth mirrors located physically between the first and second mirrors (Fig. 2). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the first optical group of Shafer have the third and fourth mirrors located in the position taught by Braat for the purpose of minimizing the size of the first optical group.

Regarding claims 14, 29 and 30, Shafer teaches wherein the numerical aperture is 0.75 or more (para. 0014).

Regarding claim 16, Shafer teaches wherein the at least four mirror of the first optical group include a convex mirror arranged most imageward in the beam path of the objective, and wherein the second optical group receives a beam from the convex mirror (Fig. 4).

Regarding claim 17, Shafer teaches wherein optical surfaces of each mirror of the objective are at least sections of surfaces of revolution each having a common axis of symmetry (Fig. 4; para. 0015).

Regarding claim 18, Shafer teaches wherein the second optical group is configured for independent compensative lateral aberrative correction. Page 9 of the current application states, "Fig. 1 shows aperture stop AS in Group G2 placed in a quasi-symmetrical manner, allowing the lateral chromatic aberration to be at least nearly self corrected within group G2 itself." Shafer teaches an aperture stop (Fig. 4) and therefore would be capable of the claimed performance as claimed.

Regarding claim 19, Shafer teaches an unobscured system aperture (Fig. 4).



Regarding claim 20, Shafer teaches wherein the unobscured aperture is located within the second optical group (Fig. 4).

Regarding claim 21, Shafer teaches being devoid of any planar folding mirrors (para 0016).

Regarding claim 22, Shafer teaches wherein an optical beam incident at the first optical group is divergent after a most imageward mirror of the first optical group (Fig. 4).

Regarding claim 23, Shafer teaches a parallel axes of symmetry of curvatures of each optical element of the first and second optical groups, and wherein no more than three of the optical elements are cut to deviate in a substantially non-rotation symmetric form (Fig. 4).

Regarding claim 24, Shafer teaches in sequence a first catadioptric sub group for producing a real intermediate image (Fig. 4), a second sub group including catoptric components for producing a virtual image (para 0015) and the second at least substantially dioptric group for producing a real image (para 0018).

Regarding claim 25, Shafer teaches in sequence a first field lens sub group (Fig. 4), a second catadioptric sub group comprising one or more negative lenses and a concave mirror (Fig. 4), generating axial chromatic aberration, a third sub group including an odd number of catoptric components (Fig. 4) and a fourth positive lens group (para 0018).

Regarding claim 26, Shafer teaches wherein the second optical group comprises a plurality of lenses, wherein a diameter of a beam incident upon each of the plurality of lenses is at least half a diameter of each lens (Fig. 4, para 0028).

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Regarding claim 27, Shafer teaches wherein the objective is doubly telecentric (para 0023).

Regarding claim 28, Shafer teaches wherein optical paths of projected rays are redirected at each lens element of the second optical group at an angle of less than substantially 20 degrees (para 0048).

### *Response to Arguments*

Applicant's arguments filed September 29, 2005 have been fully considered but they are not persuasive.

Applicant argues that the prior art fails to teach or suggest a virtual image formed optically and physically behind the sixth mirror and by the entire optical group. The Takahashi reference does meet the claim limitations as stated in the rejection above (Fig. 1). Takahashi reference teaches the same image location as seen in the drawings of the current application and therefore satisfies the claim limitations.

Applicant further argues that mask (15) of Braat cannot be interpreted as a mirror. The mask (15) is said to be a reflective mask and therefore can be interpreted by a mirror. An obvious type rejection only requires that one reasonable interpretation meet the claim limitations to properly reject the claim. Considering a reflective optical element as a mirror is a reasonable interpretation.

### *Conclusion*

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

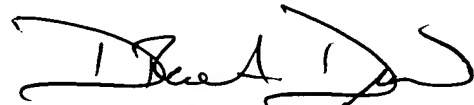
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joshua L. Pritchett whose telephone number is 571-272-2318. The examiner can normally be reached on Monday - Friday 7:00 - 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew A. Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JLP *W*

**DREW A. DUNN**  
**SUPERVISORY PATENT EXAMINER**